

Claims

1. An auger type ice making machine provided with a freezing cylinder which has an evaporator on its outer peripheral surface and into which water used for making ice is supplied, an ice-scraping auger for scraping ice formed on an inner surface of the freezing cylinder, an auger motor for driving the ice-scraping auger, a freezing apparatus which includes a compressor, a condenser and the evaporator and circulates refrigerant discharged from the compressor through the condenser and the evaporator to cool the freezing cylinder, and a motor which drives the compressor, the auger type ice making machine comprising:

pressure regulating means for keeping the pressure of refrigerant to be supplied to the evaporator at a specified low pressure;

an outlet temperature sensor for sensing refrigerant temperature at an outlet of the evaporator; and

motor controlling means for controlling the rotational speed of the motor in response to the refrigerant temperature at the outlet of the evaporator sensed by the outlet temperature sensor and thereby keeping the refrigerant temperature at the outlet of the evaporator at a specified refrigerant outlet temperature.

2. An auger type ice making machine according to claim 1, wherein the pressure regulating means comprises a constant pressure expansion valve which is interposed between the condenser and the evaporator, and whose opening is controlled and changed in response to the refrigerant pressure on a downstream side of the interposed position.

3. An auger type ice making machine according to claim 1, wherein the pressure regulating means comprises:

a variable control valve being interposed between the condenser and the evaporator; the opening of the variable control valve being electrically controlled and changed;

a pressure sensor for sensing refrigerant pressure at an inlet of the evaporator; and

opening controlling means for controlling the opening of the variable control valve in response to the refrigerant pressure sensed by the pressure sensor and thereby keeping the pressure of refrigerant to be supplied to the evaporator at a specified low pressure.

4: An auger type ice making machine according to claim 1, wherein the pressure regulating means comprises:

a variable control valve being interposed between the condenser and the evaporator; the opening of the variable control valve being electrically controlled and changed;

an inlet temperature sensor for sensing refrigerant temperature at an inlet of the evaporator; and

opening controlling means for controlling the opening of the variable control valve in response to the refrigerant temperature sensed by the inlet temperature sensor and thereby keeping the pressure of refrigerant to be supplied to the evaporator at a specified low pressure.

5. An auger type ice making machine according to any one of claims

1 to 4, wherein

the freezing cylinder is placed vertically along the axis thereof, receives water for making ice at a lower part thereof and discharges scrapped ice from an upper part thereof;

the evaporator is provided on the outer peripheral surface of the freezing cylinder, ranging from the upper part to the lower part of the freezing cylinder; and

the inlet of the evaporator into which refrigerant flows is placed at the upper part of the freezing cylinder.

6. An auger type ice making machine according to any one of claims 1 to 5 further comprising:

an ambient temperature sensor for sensing ambient temperature;
and

refrigerant outlet temperature change controlling means for decreasing the specified refrigerant outlet temperature as the sensed ambient temperature rises.

7. An auger type ice making machine according to any one of claims 1 to 5 further comprising:

a water temperature sensor for sensing temperature of water to be supplied to the freezing cylinder; and

refrigerant outlet temperature change controlling means for decreasing the specified refrigerant outlet temperature as the sensed water temperature rises.

8. An auger type ice making machine according to any one of claims 1 to 5 further comprising:
- a current sensor for sensing current flowing into the auger motor; and
- refrigerant outlet temperature change controlling means for increasing the specified refrigerant outlet temperature as the sensed current increases.
9. An auger type ice making machine according to any one of claims 1 to 5 further comprising:
- a torque sensor for sensing torque transmitted from the auger motor to the ice-scraping auger; and
- refrigerant outlet temperature change controlling means for increasing the specified refrigerant outlet temperature as the sensed torque increases.
10. An auger type ice making machine according to any one of claims 1 to 5 further comprising:
- a distortion sensor for sensing distorted amount of the freezing cylinder; and
- refrigerant outlet temperature change controlling means for increasing the specified refrigerant outlet temperature as the sensed distorted amount increases.
11. An auger type ice making machine according to any one of claims 1 to 10 further comprising:

a performance inputting device for inputting performance of the freezing apparatus; and

refrigerant outlet temperature setting controlling means for setting the specified refrigerant outlet temperature in accordance with the input performance.

12. An auger type ice making machine provided with a freezing cylinder which has an evaporator on its outer peripheral surface and into which water used for making ice is supplied, an ice-scraping auger for scraping ice formed on an inner surface of the freezing cylinder, an auger motor for driving the ice-scraping auger, a freezing apparatus which includes a compressor, a condenser and the evaporator and circulates refrigerant discharged from the compressor through the condenser and the evaporator to cool the freezing cylinder, and a motor which drives the compressor, the auger type ice making machine comprising:

a variable control valve being interposed between the condenser and the evaporator; the opening of the variable control valve being electrically controlled and changed;

an outlet temperature sensor for sensing refrigerant temperature at an outlet of the evaporator;

an outlet pressure sensor for sensing refrigerant pressure at the outlet of the evaporator;

saturation temperature calculating means for calculating saturation temperature of refrigerant on the basis of the sensed refrigerant pressure at the outlet of the evaporator;

superheat calculating means for subtracting the calculated

saturation temperature from the sensed refrigerant temperature at the outlet of the evaporator and thereby obtaining the degree of superheat of refrigerant in the evaporator; and

valve opening controlling means for controlling the opening of the variable control valve such that the calculated degree of superheat is kept at a specified degree of superheat.

13. An auger type ice making machine provided with a freezing cylinder which has an evaporator on its outer peripheral surface and into which water used for making ice is supplied, an ice-scraping auger for scraping ice formed on an inner surface of the freezing cylinder, an auger motor for driving the ice-scraping auger, a freezing apparatus which includes a compressor, a condenser and the evaporator and circulates refrigerant discharged from the compressor through the condenser and the evaporator to cool the freezing cylinder, and a motor which drives the compressor, the auger type ice making machine comprising:

a variable control valve being interposed between the condenser and the evaporator; the opening of the variable control valve being electrically controlled and changed;

an outlet temperature sensor for sensing refrigerant temperature at an outlet of the evaporator;

an inlet temperature sensor for sensing refrigerant temperature at an inlet of the evaporator;

superheat calculating means for subtracting the sensed refrigerant temperature at the inlet of the evaporator from the sensed refrigerant temperature at the outlet of the evaporator and thereby obtaining the degree

of superheat of refrigerant in the evaporator; and
valve opening controlling means for controlling the opening of the variable control valve such that the calculated degree of superheat is kept at a specified degree of superheat.

14. An auger type ice making machine according to claim 12 or 13, wherein

the freezing cylinder is placed vertically along the axis thereof, receives water for making ice at a lower part thereof and discharges scrapped ice from an upper part thereof;

the evaporator is provided on the outer peripheral surface of the freezing cylinder, ranging from the upper part to the lower part of the freezing cylinder; and

the inlet of the evaporator into which refrigerant flows is placed at the upper part of the freezing cylinder.

15. An auger type ice making machine according to any one of claims 12 to 14 further comprising:

an ambient temperature sensor for sensing ambient temperature; and

superheat change controlling means for decreasing the specified degree of superheat as the sensed ambient temperature rises.

16. An auger type ice making machine according to any one of claims 12 to 14 further comprising:

a water temperature sensor for sensing temperature of water to be

supplied to the freezing cylinder; and
superheat change controlling means for decreasing the specified
degree of superheat as the sensed water temperature rises.

17. An auger type ice making machine according to any one of
claims 12 to 14 further comprising:

a current sensor for sensing current flowing into the auger motor;
and

superheat change controlling means for increasing the specified
degree of superheat as the sensed current increases.

18. An auger type ice making machine according to any one of
claims 12 to 14 further comprising:

a torque sensor for sensing torque transmitted from the auger motor
to the ice-scraping auger; and

superheat change controlling means for increasing the specified
degree of superheat as the sensed torque increases.

19. An auger type ice making machine according to any one of
claims 12 to 14 further comprising:

a distortion sensor for sensing distorted amount of the freezing
cylinder; and

superheat change controlling means for increasing the specified
degree of superheat as the sensed distorted amount increases.

20. An auger type ice making machine according to any one of

claims 12 to 19 further comprising:

a performance inputting device for inputting performance of the freezing apparatus; and

superheat setting controlling means for setting the specified degree of superheat in accordance with the input performance.